CORNELL UNIVERSITY ANNOUNCEMENTS

JANUARY 23, 1963

NUTRITION 1963-1964

GRADUATE SCHOOL OF NUTRITION

ACADEMIC CALENDAR (Tentative)

1963–1964		1964–1965
Sept. 21 ....S	Freshman Orientation	Sept. 19 ....S
Sept. 23 ...M	Registration, new students	Sept. 21 ...M
Sept. 24 ...T	Registration, old students	Sept. 22 ...T
Sept. 25 ...W	Instruction begins, 1 p.m.	Sept. 23 ...W
Nov. 13 ...W	Midterm grades due	Nov. 11 ...W
	Thanksgiving recess:	
Nov. 27 ...W	Instruction suspended, 12:50 p.m.	Nov. 25 ...W
Dec. 2 ...M	Instruction resumed, 8 a.m.	Nov. 30 ...M
	Christmas recess:	
Dec. 21 ....S	Instruction suspended, 12:50 p.m.	Dec. 19 ....S
Jan. 6 ...M	Instruction resumed, 8 a.m.	Jan. 4 ...M
Jan. 25 ....S	First-term instruction ends	Jan. 23 ....S
Jan. 27 ...M	Second-term registration, old students	Jan. 25 ...M
Jan. 28 ...T	Examinations begin	Jan. 26 ...T
Feb. 5 ...W	Examinations end	Feb. 3 ...W
Feb. 6 ..Th	Midyear recess	Feb. 4 ..Th
Feb. 7 ....F	Midyear recess	Feb. 5 ....F
Feb. 8 ....S	Registration, new students	Feb. 6 ....S
Feb. 10 ...M	Second-term instruction begins	Feb. 8 ...M
Mar. 27 ....F	Midterm grades due (at 12 noon)	Mar. 26 ....F
	Spring recess:	
Mar. 28 ....S	Instruction suspended, 12.50 p.m.	Mar. 27 ....S
Apr. 6 ...M	Instruction resumed, 8 a.m.	Apr. 5 ...M
May 30 ....S	Second-term instruction ends	May 29 ....S
June 1 ...M	Examinations begin	May 31 ...M
June 9 ...T	Examinations end	June 8 ...T
June 15 ...M	Commencement Day	June 14 ...M

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CORNELL UNIVERSITY

GRADUATE SCHOOL OF NUTRITION

1963-1964

The Graduate School of Nutrition, a unit of Cornell University, is supported in part by state appropriations through the State University of New York

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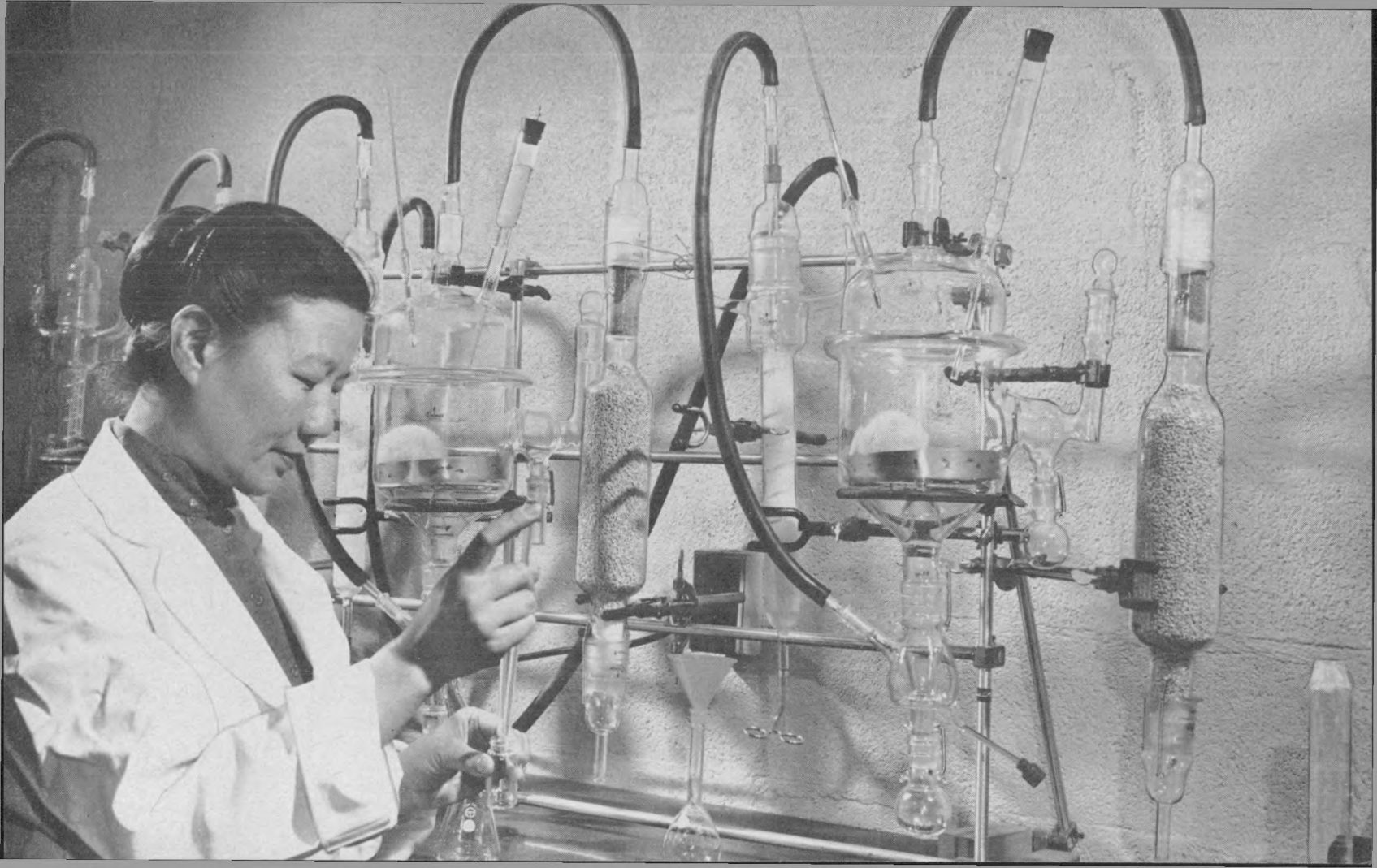

FACULTY

ADMINISTRATION

MALOTT, DEANE W., A.B., M.B.A., LL.D., D.C.S., President of the University
ATWOOD, SANFORD S., Ph.D., Provost of the University
BARNES, RICHARD H., Ph.D., Dean of the School
YOUNG, CHARLOTTE M., Ph.D., Secretary of the School

REGISTER OF FACULTY AND STAFF

In this list the titles and departments of primary affiliation of faculty members are indicated.

ASDELL, S. A., Ph.D., Professor, Animal Husbandry
BAKER, ROBERT C., Ph.D., Professor, Poultry Husbandry
BARNES, LEROY L., Ph.D., Professor, Physics
BARNES, RICHARD H., Ph.D., Professor, Graduate School of Nutrition
BERRESFORD, KATHLEEN, M.S., Editor of Publications, Graduate School of Nutrition
BRADFIELD, ROBERT B., Ph.D., Research Associate, Graduate School of Nutrition
BROWN, VIRGINIA, B.S., Research Assistant, Graduate School of Nutrition
BUCK, PAUL, Ph.D., Associate Professor, Dairy and Food Science
CALL, DAVID L., Ph.D., Associate Professor, Babcock Professorship, Graduate School of Nutrition
COMAR, CYRIL L., Ph.D., Professor, Physical Biology
DAMP, JESSICA P., A.B., Research Assistant, Graduate School of Nutrition
DANIEL, LOUISE J., Ph.D., Professor, Biochemistry
DARLING, C. DOUGLAS, M.D., Professor, Clinical and Preventive Medicine
FIALA, GRACE F., A.B., Research Assistant, Graduate School of Nutrition
FINN, ROBERT K., Ph.D., Professor, Chemical Engineering
GAYLOR, JAMES L., Ph.D., Assistant Professor, Graduate School of Nutrition
GILBERT, KENNETH E., B.S., Administrative Aide, Graduate School of Nutrition
HACKLER, L. ROSS, Ph.D., Assistant Professor, Food Science and Technology, Geneva
HAND, DAVID B., Ph.D., Professor, Food Science and Technology, Geneva
HARTMAN, JOHN D., Ph.D., Professor, Vegetable Crops
HERRINGTON, BARBOUR L., Ph.D., Professor, Dairy and Food Science
HESTER, E. ELIZABETH, Ph.D., Associate Professor, Food and Nutrition
HOLLEY, ROBERT W., Ph.D., Associate Professor, Biochemistry
HOGUE, DOUGLAS E., Ph.D., Assistant Professor, Animal Husbandry
HUCKLER, GEORGE J., Ph.D., Professor, Food Science and Technology, Geneva
ISENBERG, FRANCIS M. R., Ph.D., Professor, Vegetable Crops
JOHNSTON, FRANCES, A., Ph.D., Professor, Food and Nutrition
KROOK, LENNART P., Ph.D., Associate Professor, Pathology and Bacteriology
KWONG, EVA, Ph.D., Research Specialist, Graduate School of Nutrition
LEE, FRANK A., Ph.D., Associate Professor, Food Science and Technology, Geneva

In a study of the body's use of protein, an amino acid is labeled with tracer amounts of radioactive carbon and administered to rats maintained in special metabolism chambers.

LENGEMANN, FRED W., Ph.D., Associate Professor, Radiation Biology
LONGRÉE, KARLA, Ph.D., Professor, Institution Management
LOOSLI, JOHN K., Ph.D., Professor, Animal Husbandry
MATTICK, LEONARD R., Ph.D., Assistant Professor, Food Science and Technology, Geneva
MAYNARD, LEONARD A., Ph.D., Professor Emeritus, Graduate School of Nutrition
MCCORMICK, DONALD B., Ph.D., Assistant Professor, Graduate School of Nutrition
MONDY, NELL, Ph.D., Associate Professor, Food and Nutrition
MOORE, NORMAN S., M.D., Professor, Clinical and Preventive Medicine
MORRISON, MARY A., Ph.D., Associate Professor, Food and Nutrition
MOYER, JAMES C., Ph.D., Professor, Food Science and Technology, Geneva
NELSON, WALTER L., Ph.D., Professor, Biochemistry
NESHEIM, MALDEN C., Ph.D., Assistant Professor, Poultry Husbandry
NEWMAN, KATHERINE J., Ph.D., Associate Professor, Food and Nutrition
PEDERSON, CARL S., Ph.D., Professor, Food Science and Technology, Geneva
PERSONIUS, CATHERINE J., Ph.D., Professor, Food and Nutrition
POND, WILSON, Ph.D., Associate Professor, Animal Husbandry
REID, JOHN THOMAS, Ph.D., Professor, Animal Husbandry
ROBINSON, WILLARD B., Ph.D., Professor, Food Science and Technology, Geneva
ROE, DAPHNE ANDERSON, M.D., Research Associate, Clinical and Preventive Medicine
SCOTT, MILTON L., Ph.D., Professor, Poultry Husbandry
SEELEY, HARRY W., JR., Ph.D., Professor, Dairy and Food Science
SHALLENBERGER, ROBERT S., Ph.D., Associate Professor, Food Science and Technology, Geneva
SMITH, ORA, Ph.D., Professor, Vegetable Crops
SMITH, SEDGWICK E., Ph.D., Professor, Animal Husbandry
SMOCK, ROBERT M., Ph.D., Professor, Pomology
STEININGER, GRACE, Ph.D., Professor, Food and Nutrition
TURK, KENNETH L., Ph.D., Professor, Animal Husbandry
VANBUREN, JEROME P., Ph.D., Assistant Professor, Food Science and Technology, Geneva
VAN VEEN, ANDRÉ G., Ph.D., Professor, Graduate School of Nutrition
WARNER, RICHARD G., Ph.D., Associate Professor, Animal Husbandry
WASSERMAN, ROBERT H., Ph.D., Associate Professor, Physical Biology
WELLINGTON, GEORGE H., Ph.D., Professor, Animal Husbandry
WILLIAMS, HAROLD H., Ph.D., Professor, Biochemistry
WRIGHT, LEMUEL D., Ph.D., Professor, Graduate School of Nutrition
YOUNG, CHARLOTTE M., Ph.D., Professor, Graduate School of Nutrition
YOUNG, ROBERT J., Ph.D., Associate Professor, Poultry Husbandry

THE GRADUATE SCHOOL OF NUTRITION

THE GRADUATE SCHOOL OF NUTRITION at Cornell offers unique and diverse research and training programs in food and nutrition, for both men and women. The resources of many departments and divisions of the University are combined to provide a special academic program leading to the professional degrees, Master of Nutritional Science (M.N.S.) or Master of Food Science (M.F.S.).

The School prepares its students for a variety of careers in the fields of nutritional and food science. Many graduates go into industrial or academic research involving nutritional biochemistry. Others hold positions in clinical nutrition, public health, college teaching, the animal feed industry, and in food technology. Because of the surging interest in nutrition programs in economically developing countries, there is increased emphasis on training students for posts as nutritionists for government and international agencies, such as WHO, FAO, UNICEF, and others.

The life science of nutrition has developed and broadened as knowledge of its many facets has accumulated through research. At one time, the study of nutrition was limited to training in biochemistry, physiology and biology, and the relationship of these to health and disease. Today nutritional science must also be related to such fields as education, sociology, psychology, cultural anthropology, food technology, and economics. And the Graduate School of Nutrition provides advanced study in such an integrated program.

Through a carefully planned curriculum, the student receives a firm foundation in sciences basic to nutrition, along with practical preparation for work in the professional field of his choice. He is assigned a faculty adviser in whose special field his own interests lie. The adviser plans the curriculum and directs the student's special research problem in either nutritional or food science, within the framework of courses basic to nutrition, and required by the School.

The faculty of the School includes biochemists, physicians, animal nutritionists, human nutritionists, food economists, and food scientists. These professors, many of whom are appointed primarily in cooperating departments or colleges, act as advisers, and direct the research problems of students. Only with a faculty of outstanding scientists and the cooperation of the contributing colleges at Cornell would such an integrated academic program of research and teaching in nutrition be possible.

CURRICULUM AND DEGREES

The Graduate School of Nutrition offers a curriculum providing for specialization in either nutritional science or food science. Its degrees of Master of Nutritional Science and Master of Food Science are awarded by the Cornell Graduate School. These are awarded after satisfactory completion of a prescribed

core of courses considered basic to an understanding of nutritional and food science at the Master's level, regardless of the field of special interest. In addition, specially chosen electives prepare each student for the field of his choice. The degrees represent a defined accomplishment in the area of nutritional science or food science.

The candidate for a degree prepares a report representing 6 to 10 semester hours credit based on his original research of a special problem. The special problem report is of thesis caliber.

The curriculum completed for the M.N.S. and M.F.S. degrees establishes an excellent background for advanced study. Students who have obtained these degrees frequently continue studies leading to the Ph.D. in such fields as biochemistry, food science and technology, animal nutrition, or food and nutrition.

ADMISSION

To be admitted to the School the applicant must hold a baccalaureate degree from a college or university of recognized standing or have done work equivalent to that required for such a degree. He must have a definite professional interest in the field of either nutritional science or food science. In order to qualify as a candidate for one of the graduate degrees, his training must include the completion, with a superior record, of courses in the following subjects, with the approximate number of semester hours as stated.

COURSE REQUIREMENTS

PHYSICAL SCIENCES—20 HOURS

Chemistry, physics, mathematics. Courses in quantitative chemistry and organic chemistry are prerequisites to courses required for graduation. If they are not offered for entrance, they must be taken following admission. Students who enter without college training in physics are required to take an elementary course in this subject before graduation. Credits for beginning courses in physics and chemistry, including organic and quantitative analysis, cannot be counted toward graduation.

BIOLOGICAL SCIENCES

Biology, botany, zoology, bacteriology, physiology.

For candidates for the M.N.S. degree—12 hours:

Courses in animal or human nutrition up to three hours may be counted in the biological sciences. Elementary courses in bacteriology or physiology cannot be counted toward graduation.

For candidates for the M.F.S. degree—8 hours:

Elementary courses in bacteriology cannot be counted toward graduation. However, an elementary course in bacteriology is prerequisite for advanced courses in bacteriology.

SOCIAL STUDIES—9 HOURS

Suggested subjects are economics, government, education, psychology, sociology, anthropology, and history.

OTHER COURSES

The applicant's record must show evidence that he has satisfactorily completed other courses prerequisite to those required by a candidate for a degree. An applicant who cannot meet in full the specific course requirements may be admitted if the faculty of the School so recommends, with the understanding that the deficiencies must be made up before graduation.

NONCANDIDATES

Admission as noncandidates is open to applicants who desire to register for a term or more to take specific courses but who do not wish to become candidates for a degree. Such applicants must hold Bachelors' degrees, must meet the other requirements specified for admission, and must show evidence that the courses desired will be of special benefit to them in their professional careers.

UNIVERSITY REQUIREMENTS

Applicants must meet the general requirements for admission to the Graduate School as set forth in the *Announcement of General Information* and the *Announcement of the Graduate School.*

HEALTH REQUIREMENTS

The following health requirements for entering graduate students have been adopted by the Cornell Board of Trustees. Failure to fulfill these requirements will result in loss of the privilege of registering the following term. The responsibility for fulfilling these requirements rests with the student.

IMMUNIZATION

A satisfactory certificate of immunization against smallpox, on the form supplied by the University, must be submitted before registration. It will be accepted as satisfactory only if it certifies that within the last three years a successful vaccination has been performed. If this requirement cannot be fulfilled by the student's home physician, opportunity for immunization will be offered by the Cornell medical staff during the student's first semester, with the cost to be borne by the student. If a student has been absent from the University for more than three years, immunity will be considered to have lapsed, and a certificate of revaccination must be submitted.

HEALTH HISTORY

Students accepted for admission will be required to submit health histories on forms supplied by the University.*

X-RAY

Every student is required to have a chest X-ray. He may (1) present a chest film, made by a private physician, on or before entering Cornell, provided

* When a student who has been away from the University wishes to re-enter, he must, at his own expense, once more fulfill the chest X-ray requirement and also fill out a new health history.

that it was obtained within six months of initial registration and is of acceptable quality; *or* (2) he may present a chest X-ray report, provided that the radiograph was taken within the six months of initial registration, contains the film number and name and address of the X-ray facility, and is signed by a radiologist; *or* (3) he may have a chest X-ray at Cornell during the orientation period or at some other specified time shortly thereafter, in which case the charge will be included in the registration fee.*

REGISTRATION AND APPLICATIONS

All students admitted to the Graduate School of Nutrition must register through the Graduate School Office, 125 Day Hall, at the beginning of each term or session.

Applicants for admission should address their inquiries to the Office of the Graduate School, Cornell University, Ithaca, New York. No application will be acted upon until all credentials enumerated in the application form have been filed.

REQUIREMENTS FOR GRADUATION

The requirements for graduation call for the completion of at least two units of residence and the completion of at least 36 semester hours of specified and approved courses of which not more than 10 can be in research (Graduate School of Nutrition 199). In the event that certain required courses have been completed satisfactorily by the student prior to his admission to the Graduate School, substitutions will be made with the approval of his faculty adviser.

Certain elective courses may be required as deemed appropriate by the adviser and the faculty of the Graduate School of Nutrition to round out the student's professional training in nutritional science or food science. The student must prepare a written report on an approved problem that may or may not require laboratory research, and must pass a final examination. The curriculum differs in accordance with the field in which the student wishes to specialize, as follows:

NUTRITIONAL SCIENCE

The specialized training in this field, leading to the degree of Master of Nutritional Science, emphasizes the basic scientific knowledge and techniques of nutrition. The completion of the following curriculum is required:

	Hours
Biochemistry	6
Principles of Nutrition	3
Laboratory work in nutrition	3
Advanced Physiology	6
Food Economics	3
Statistics	3
History of Nutrition	1
Seminars	1
Advanced courses in human or animal nutrition	4
Special problem	6 to 10

In addition, the requirements include such approved electives as the faculty adviser and the faculty of the School may deem appropriate and necessary to round out the student's training in the field of nutritional science.

Faculty advising students for the M.N.S. degree include Professors S. A. Asdell, L. L. Barnes, R. H. Barnes, C. L. Comar, L. J. Daniel, J. L. Gaylor, L. R. Hackler, R. W. Holley, D. E. Hogue, F. A. Johnston, L. P. Krook, F. W. Lengemann, J. K. Loosli, D. B. McCormick, N. S. Moore, M. A. Morrison, W. L. Nelson, M. C. Nesheim, K. J. Newman, W. Pond, J. T. Reid, M. L. Scott, S. E. Smith, G. Steininger, K. L. Turk, A. G. van Veen, R. G. Warner, R. H. Wasserman, H. H. Williams, L. D. Wright, C. M. Young, and R. J. Young.

COURSES APPROVED FOR ADVANCED NUTRITION CREDIT

		Hours
F.N. 324	Nutrition	3[a]
F.N. 330	Diet Therapy	3
F.N. 400	Readings in Nutrition	2
F.N. 401	Readings in Nutrition	2
F.N. 424	Advanced Nutrition	2
F.N. 440	Nutrition and Growth	2
Sch. Nutr. 100	Problems and Programs in International Nutrition	3
P.H. 210	Advanced Poultry Nutrition	2
An. Hus. 210	Special Topics in Animal Nutrition	1[b]
C.P.M. 392	Clinical and Public Health Nutrition	3
C.P.M. 381	Field Observation and Experience in Nutrition	1
C.P.M. 382	Field Observation and Experience in Nutrition	1
Biochem. 150	Biochemistry and Nutrition of the Vitamins	2
Biochem. 160	Nutritional Biochemistry	3
Biochem. 301	Special Topics in Biochemistry	1 or 2[b]
Vet. Path. and Bact. 155	Pathology of Nutritional Diseases	3

FOOD SCIENCE

The specialized training in this field, leading to the degree of Master of Food Science, emphasizes the sciences involved in food processing and utilization. The completion of the following curriculum is required.

	Hours		*Hours*
Biochemistry	6	Statistics	3
Advanced courses in bacteriology	6	Nutrition	3
Approved courses in food science	11	Seminars	1
		Special problem	6 to 10

In addition, the requirements include such approved electives as the faculty adviser and the faculty of the School may deem appropriate and necessary to round out the student's training in the field of food science.

Faculty advising students for the M.F.S. degree include Professors R. C. Baker, R. H. Barnes, P. A. Buck, R. K. Finn, D. B. Hand, J. D. Hartman, B. L. Herrington, E. E. Hester, G. J. Hucker, F. M. R. Isenberg, F. A. Lee, K. Longrée, L. R. Mattick, N. Mondy, J. C. Moyer, W. L. Nelson, C. S. Pederson, C. J. Personius, W. B. Robinson, H. W. Seeley, R. S. Shallenberger, O. Smith,

[a] If equivalent not previously taken.
[b] Depending upon the topic.

R. M. Smock, J. P. VanBuren, A. G. van Veen, G. A. Wellington, and L. D. Wright.

COURSES APPROVED FOR FOOD SCIENCE

		Hours
F.N. 316	Science of Food	3 or 4
F.N. 317	Science of Food, Laboratory	1
F.N. 318	Experimental Food Methods	2
F.N. 403	Special Problems for Graduate Students	[a]
F.N. 404	Readings in Foods	2
Food Sci. 101	Principles of Food Technology	3 or 5
Food Sci. 102	Principles of Food Technology	3 or 5
D.S. 103	Food Products from Milk Fermentations	5
D.S. 111	Analytical Methods	4
D.S. 113	Chemistry of Milk	2[b]
D.S. 130	Dairy and Food Engineering	4
Pomology 111	Post-Harvest Physiology, Handling and Storage of Fruits	3
P.H. 150	Poultry Meat and Egg Technology	3
Veg. Crops 22	Potato Production and Processing	3
Veg. Crops 112	Handling and Marketing Vegetable Crops, Advanced course	4
Biochem. 140	Food Biochemistry	3
Biochem. 150	Biochemistry and Nutrition of the Vitamins	2
Hotel Adm. 206	Meats, Poultry and Fish	3
Sch. Nutr. 100	Problems and Programs in International Nutrition	3
Sch. Nutr. 159	Food Economics	3
Sch. Nutr. 250	Seminar in Food and Population	2

SPECIAL PROBLEM

The work involved in the report on an individual problem required for both degrees may be carried out with the approval of the student's faculty adviser under the direction of any member of the faculty of the School whom the student may choose and who is willing to supervise it. The report must be approved by the supervising faculty member and the original copy submitted to the Office of the Dean of the Graduate School of Nutrition at least one week prior to the beginning of the final examination period. Directions concerning the form in which the report is to be presented may be obtained either from the student's faculty adviser or from the Office of the Dean of the Graduate School of Nutrition.

EXAMINATION

A final examination, either oral or written or both, is required for either degree. Examinations are conducted by a committee consisting of the faculty adviser plus one other member to be designated by the faculty of the Graduate School of Nutrition or its delegated agent.

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[a] Credits as arranged.

[b] Depending upon the topic.

CREDIT FOR SUMMER SESSION STUDY

A student registered in the School may receive credit for work done in the University Summer Session if his program is approved in advance by his faculty adviser. To receive this credit he must also be registered in the Summer Session.

A student who has been registered in the School for one term after receiving his Bachelor's degree may, with the approval of his faculty adviser, register for a minimum of four and a maximum of twelve weeks for work in the summer on his individual problem under personal direction of a member of the faculty of the School and thus earn residence credit. The student can thus make use of the summer period to meet, in whole or in part, the requirements of six to ten hours granted upon the completion of his report on an approved problem.

RESIDENCE REQUIREMENTS

A student must complete at least two terms of residence after receiving the Bachelor's degree from Cornell or elsewhere to receive a degree from the School. (In most instances, students need more than two terms of residence in which to complete all degree requirements.)

TRAINING FOR SPECIALIZED FIELDS

FOOD SCIENCE

Growing emphasis on food—its availability, quality, processing, packaging, as well as its nutritive value—indicates a period of expanding opportunities for those trained in food science. The Graduate School of Nutrition offers programs for M.F.S. candidates which lead to careers in food production, research, quality control, technical sales, teaching, and government and international nutrition work.

Since all techniques for food processing and handling must be based on a thorough knowledge of food characteristics, the Graduate School of Nutrition prescribes an M.F.S. program emphasizing the sciences fundamental to the field, namely, chemistry, biochemistry, and bacteriology. The student who masters these sciences may easily learn the details of special food techniques on the job. His basic academic training therefore does not include specialized technology courses in food processing, packaging, and the like.

Work on the special problem may be carried on either at the Ithaca campus or at the New York State Agricultural Experiment Station at Geneva, New York. Staff members advise students and acquaint them with the several research projects under way, including studies of food spoilage, flavor, composition, preservation, fermentation, and irradiation effects.

NUTRITIONAL SCIENCE

Many opportunities are open to graduates with the M.N.S. degree. Among these are positions in research in universities, government and industrial laboratories, metabolic wards and clinics in hospitals, college teaching, and nutrition education and public health work in local, state, national and international agencies. Foreign students receive training useful in many teaching and governmental positions in their native countries.

The basic training for the M.N.S. degree emphasizes the physical and bio-

logical sciences and the principles of nutrition of all species. Through appropriate electives, students learn to apply these disciplines in either human or animal nutrition. Facilities for research include biochemical, microbiological, and physiological laboratories, experimental animal quarters, a diet table for experimental work in human nutrition, a metabolic unit in the Cornell Infirmary for the study of nutrition in relation to disease, and often, opportunity to participate in surveys.

Special opportunities are provided for students of appropriate background who wish to prepare themselves for work as community nutritionists with health and welfare agencies. Here, the approved electives will include certain phases of social science, the elements of public health, clinical and public health nutrition, and appropriate informational service techniques. Opportunities for supervised experiences with community and health agencies are available for selected students. Students accepted for training in this area must plan financially for three to four weeks of residence away from Cornell to cover the field experience. Two weeks of this will be in the fall just prior to the academic year; the third and possible fourth week may be either during the spring recess or immediately following final examinations. In addition, suitable students are urged to spend a two months' period in the summer in "in-service" training in nutrition as applied to the community and to public health. Help will be given in making the necessary contacts. These opportunities will provide assignments which can be used as the basis for meeting the requirement for a report on an individual problem.

To meet the need for professionally trained men and women in government and international agencies, the School offers a program in international nutrition. Designed especially for American students, it is open also to others interested in the practical application of nutrition and food science to the problems of developing countries. The program includes courses in the sciences basic to nutrition that are extensive enough to equip students for a variety of careers in nutrition. Emphasis in electives is then placed on specialized study in problems and programs in international nutrition and related fields such as agriculture, public health, extension teaching, sociology and anthropology. When the opportunity exists, field experience will be given. Training will also be integrated with agricultural and public health programs whenever possible. Several traineeships and assistantships are available to qualified students. For further details, request the descriptive leaflet, *Program in International Nutrition,* from the School.

Students with interest in the feed industry should have completed reasonably broad training in livestock production, including poultry, prior to admission. The training will stress principles of animal nutrition, animal physiology, experimental methods, and analytical procedures. To round out the training, courses in food economics, marketing, and business administration are provided.

TUITION AND FEES

A registration deposit of $28 must be made by every applicant accepted for admission unless the candidate has previously matriculated as a student at Cornell University. A check or money order payable to Cornell University should be remitted to the Graduate School, 125 Day Hall, upon notification of acceptance by the Graduate School of Nutrition. This deposit pays the matriculation

fee, chest X-ray fee, and examination book charge and covers certain expenses incident to graduation if the student receives a degree. The deposit will not be refunded to any candidate who withdraws his application after May 22, or after 20 days following his admission approval.

Limited refunds of tuition and fixed fees will be made to students who withdraw from the University prior to the completion of a term, for reasons accepted as satisfactory. For students who do not complete a term, tuition and other fees will be charged at the rate of 10 per cent for each week, or fraction of a week, from the first day of registration to the date of withdrawal as certified by the School; if, however, withdrawal is made within six days of the date of registration, no charge is assessed. The registration deposit will not be refunded.

The tuition for students registered in the Graduate School of Nutrition is $150 a term payable at the beginning of each term. Certain assistantships carry a waiver of tuition.

A College and University Fee of $143 a term payable at the beginning of each term is required of each registrant of the Graduate School of Nutrition whether he is receiving full residence credit or not. This general fee contributes toward the services supplied by the libraries, Clinic and Infirmary, and the student union in Willard Straight Hall, and pays a portion of the extra cost of laboratory courses and general administration.

Students of the Graduate School of Nutrition who attend classes in the Summer Session must register both in the Graduate School and in the Summer Session and pay the tuition and other fees required by the Summer Session.

A graduate student who returns to the University to present his thesis and to take the final examination for an advanced degree, all other work for that degree having been previously completed, must register as a "candidate for degree only" and pay a fee of $35.

Tuition or fees may be changed by the Trustees at any time without previous notice.

ASSISTANTSHIPS AND TRAINEESHIPS

A number of assistantships and traineeships are available in the School's research programs. These require not more than twenty hours' work a week, and any student in the School may apply for this type of financial aid. The stipend is approximately $2,600 for a twelve-month appointment; in some instances it is pro-rated on a nine-month basis. The appointments carry waiver of tuition, but the student must pay all fees required by the Graduate School. For September appointment, application should be made by March 1 to the Secretary, Graduate School of Nutrition, Savage Hall. Announcement of appointments will be made on or about April 1.

PUBLIC HEALTH TRAINEESHIPS FOR PUBLIC HEALTH PERSONNEL

Students interested in preparing for positions as public health nutritionists may apply for public health traineeship awards from the U. S. Public Health Service. Applicants may secure application forms and additional information from any of the Regional Medical Directors of the U. S. Public Health Service or from the Chief, Division of General Health Services, Bureau of State Services,

Public Health Service, U. S. Department of Health, Education, and Welfare, Washington, D. C.

ADVISORY SERVICE FOR STUDENTS PREPARING AT CORNELL TO ENTER THE SCHOOL

Students in the Colleges of Agriculture, Arts and Sciences, or Home Economics at Cornell University, who prepare for admission to the Graduate School of Nutrition, may be advised during the period of preparation by members of the faculty of the School who are also members of the faculty of the college in which the students matriculate.

Undergraduates who are interested in nutrition and who are matriculating at Cornell University for the first time should state upon the application for admission that nutrition is the business or profession (field of work) which they expect to enter upon completion of their studies. This is necessary in order that appropriate faculty advisers may be assigned to them.

HEALTH SERVICES AND MEDICAL CARE

The health services and medical care of Cornell students are centered in the Gannett Medical Clinic (the out-patient department) and in the Cornell Infirmary (hospital). Students may consult a physician at the Clinic whenever need arises and receive treatment in cases that do not require hospitalization. If indicated, hospitalization in the Infirmary for a maximum of fourteen days each term is included. (A per diem charge is made if hospitalization extends beyond fourteen days.) For details of the health and medical services covered by the student's College and University General Fee, see the *Announcement of General Information*. Insurance is available on a voluntary basis to supplement the services provided by the general fee; information about such insurance may be obtained from the Gannett Medical Clinic.

GRADUATE STUDENT HOUSING

University dormitory housing is available to single graduate students in Sage Hall, a graduate center accommodating approximately 200 men and women. Situated in the heart of the campus, the Center is convenient to all colleges. Its dining facilities are operated as a public cafeteria.

The University also maintains unfurnished apartments for 400 married students and their families, in attractive areas adjacent to the campus—Cornell Quarters, Pleasant Grove Apartments, and Hasbrouck Apartments.

Detailed information on all types of housing may be obtained by writing the Department of Residential Halls, 223 Day Hall. Applications for all University housing should be made as soon as possible after January 1 for fall matriculants; after October 1 for spring matriculants.

Rooms and apartments adjacent to the campus or in the downtown area are available in limited number. Students desiring off-campus housing should arrange to come to Ithaca well in advance of the term opening to arrange for such accommodation. Inquiries may be directed to the Department of Residential Halls.

DESCRIPTION OF COURSES

THE FOLLOWING list of courses includes both those previously specified as required for the degrees offered and some of those from which electives may be selected, with the approval of the student's faculty adviser, in accordance with his specific field of interest.

The information in parentheses following the name of the course refers to the college in which the course is given, the department, and the course number. In registering for any of these courses the information shown in the parentheses should be given rather than the name of the course. In some instances the time and place are not given in the descriptive material enclosed in the parentheses following the title of the course. To obtain this information the student should consult the specific departmental office or the individual Announcements issued by the colleges concerned.

For courses marked with an asterisk (*), "advanced nutrition" credit may be given. For those marked with a dagger (†), "advanced food science" credit may be given.

NUTRITION

PRINCIPLES OF ANIMAL NUTRITION (Agriculture; Animal Husbandry 110). Fall. Credit three hours. For seniors and graduate students. Prerequisites, a course in human or veterinary physiology and a course in organic chemistry or biochemistry. Lectures, M W F 10. Morrison 342. Professor LOOSLI.

The chemistry and physiology of nutrition and the nutritive requirements for growth, reproduction, lactation, and other body functions.

LABORATORY WORK IN ANIMAL NUTRITION (Agriculture; Animal Husbandry 111). Fall. Credit three hours. Prerequisites, Quantitative Analysis, Animal Husbandry 110 or its equivalent, and permission of the instructor. Class limited to 18 students each term. M W F 2–4:20. Morrison 342 and 443. Associate Professor WARNER and assistants.

Each student engages in a series of short research projects with experimental animals, such as rats, dogs, and sheep. Both classical and modern techniques of animal experimentation are taught. The applications of biochemical methods to the solution of animal nutrition problems are included.

NUTRITION (Home Economics; Food and Nutrition 324). Spring. Credit three hours. Prerequisites, elementary college courses in nutrition, biochemistry, and human physiology. Associate Professor NEWMAN.*

Discussion, T Th 8. Van Rensselaer 339. Demonstration and discussion, Th 2–4. Van Rensselaer 339. Principles of nutrition as they relate to energy metabolism and weight control, hygiene of the digestive tract, proteins, minerals, and vitamins. Application of the principles of nutrition to needs of normal individuals. During and as a result of this course the student is expected to establish and maintain good nutrition practices.

MATERNAL AND CHILD NUTRITION (Home Economics; Food and Nutrition 340). Fall and spring. Credit two hours. Prerequisite, Food and Nutrition 103 or 192. Majors interested in special training in this field may request permission to register for Food and Nutrition 440 as seniors. Associate Professor NEWMAN.

Lecture and discussion, W F 8. Van Rensselaer 339. Family nutrition with special emphasis upon the nutritional needs of the mother and child. Relation of nutrition to physical growth.

PROBLEMS AND PROGRAMS IN INTERNATIONAL NUTRITION (School of Nutrition 100). Fall. Credit three hours. Registra-

tion by permission. Lectures, M W F 11. Savage Hall. Professor VAN VEEN.* †

To acquaint students with the planning of effective programs and policies in the fields of nutritional and food science with the purpose of improving nutrition conditions in developing countries, with proper emphasis on the role of agriculture and public health. Among topics considered are: typical foods and diets in different parts of the world, assessment of food and nutrition conditions, protein-rich and other protective foods, food processing and preservation in developing countries, food standards and food control.

ADVANCED NUTRITION (Home Economics; Food and Nutrition 424). Fall. Credit two hours. Prerequisite, Food and Nutrition 324 or equivalent. M W 10. Van Rensselaer 301. Associate Professor MORRISON.*

Recent advances in nutrition. Emphasis on human nutrition.

NUTRITION AND GROWTH (Home Economics; Food and Nutrition 440). Fall. Credit two hours. Prerequisite, Food and Nutrition 324 or equivalent. Signature of instructor required for undergraduate students. Associate Professor NEWMAN.*

Information on growth that is of particular interest to nutritionists. Survey of methods used in studying physical and chemical growth. Relation between nutrition and growth.

[***READINGS IN NUTRITION (Home Economics; Food and Nutrition 400).*** Spring. Offered in even-numbered years. Credit two hours. Prerequisite, Food and Nutrition 324 or equivalent. T Th 11. Van Rensselaer 301.*

Critical review of literature in the field of vitamin and mineral metabolism, with emphasis on the experimental data on which the principles of human nutrition are based. *Not offered in 1963.*]

READINGS IN NUTRITION (Home Economics; Food and Nutrition 401). Spring. Offered in odd-numbered years. Credit two hours. Prerequisite, Food and Nutrition 324 or equivalent. T Th 11. Van Rensselaer 301. Assistant Professor RIVERS.*

Critical review of literature relating to energy metabolism, proteins, fats, and carbohydrates, with emphasis on the experimental data on which the principles of human nutrition are based.

HISTORY OF NUTRITION (Agriculture; Animal Husbandry 215). Fall. Credit one hour. Th 4:15. Savage 130. Professor LOOSLI.

The purpose of the course is to familiarize the student with the background literature in nutrition and to improve his technique in using the libraries. Each student prepares four written reports and summarizes these in brief oral reports to learn better ways to present technical information.

POULTRY NUTRITION (Agriculture; Poultry Husbandry 110). Spring. Credit three hours. Prerequisite, chemistry and physiology or permission of instructor. Not open to freshmen. Lectures, M W F 8. Rice 300. Associate Professor R. J. YOUNG.

The principles of poultry nutrition and their application to poultry feeding and feed manufacturing.

ADVANCED POULTRY NUTRITION (Agriculture; Poultry Husbandry 210). Spring. Credit two hours. For graduate students. Not given every year and not unless ten or more students apply for the course. Registration by permission. Professor SCOTT.*

A study of one or more important fields of research in poultry nutrition, a critical consideration of the experimental methods used in conducting the investigations, and discussion of further studies needed, including the planning of the experiments.

SPECIAL TOPICS IN ANIMAL NUTRITION (Agriculture; Animal Husbandry 210). Spring. Credit one hour. Registration by permission. Th 8. Morrison 342. Professors LOOSLI and S. E. SMITH.*

A presentation and discussion of the knowledge and techniques of special fields of animal nutrition, with particular reference to farm animals.

SEMINAR IN ANIMAL NUTRITION (Agriculture; Animal Husbandry 219). Fall. Credit one hour. Open to graduate students with major field of study in animal nutrition. Registration by permission. M 4:30. Morrison 348. Animal Nutrition staff.

A critical review of the literature and other topics of special interest to graduate students in animal nutrition.

NUTRITION SEMINAR (Agriculture; Biochemistry 292). Spring. Credit one hour. Registration by permission. M 4:15. Savage 100. Professor R. H. BARNES and staff.

SEMINAR IN NUTRITION (Home Economics; Food and Nutrition 420). Credit one hour. T 4:30. Van Rensselaer 339. Associate Professor MORRISON and department staff.

CLINICAL AND PUBLIC HEALTH NUTRITION (Clinical and Preventive Medicine

392). Spring. Credit three hours. Prerequisites, a course in nutrition, in physiology, and in biochemistry. Registration by permission of the instructor. For Graduate School of Nutrition and Graduate School students only. M W F 10. Savage 116. Professor C. M. YOUNG and members of the medical staff.*

This course is designed to familiarize the student with some of the applications of nutrition to clinical and public health problems.

FIELD OBSERVATION AND EXPERIENCE IN COMMUNITY NUTRITION (Clinical and Preventive Medicine 381–382). Throughout the year. Credit one hour (a term). Prerequisites (or in conjunction with), CPM 392 and Engineering 2532. Registration by permission only. For Graduate School of Nutrition and Graduate School students only. A two-week full-time field period just prior to the academic year and one to two weeks during the spring recess and/or immediately following final examinations in the spring term. Time and place as arranged. Visiting Assistant Professor ——— and Professor C. M. YOUNG.*

Supervised observation and experience in community nutrition programs. Students must be prepared to defray expense of living costs in the communities selected for the field experience. Every effort will be made to keep costs minimal.

DIET THERAPY (Home Economics; Food and Nutrition 330). Fall. Credit three hours. Prerequisite, Foods and Nutrition 324 or equivalent. Discussion, M W F 9. Van Rensselaer 3–M–11. Assistant Professor RIVERS.*

Study of the physiological and biochemical anomalies in certain diseases and the principles underlying nutritional therapy. Independent survey of the technical literature in this field.

NUTRITIONAL BIOCHEMISTRY (Agriculture; Biochemistry 160). Spring. Credit three hours. Prerequisites, Biochemistry 101 or the equivalent and a beginning course in nutrition, e.g., Animal Husbandry 110, Poultry Husbandry 110, or Food and Nutrition 324. Lectures, M W F 10. Savage 100. Professors R. H. BARNES and WRIGHT and Assistant Professors GAYLOR and MCCORMICK.

The biochemical bases of processes related to nutrition in the intact animal will be discussed. Emphasis will be placed on the integration of physiological and biochemical mechanisms in digestion, absorption, transport, and metabolism and will include comparative aspects of the normal and pathologic states.

PUBLIC HEALTH

ENVIRONMENTAL SANITATION (Engineering 2532). For non-civil engineering students. Fall. Credit three hours. M W F 9.

Lectures, discussions, reports, field trips. Concepts of environmental sanitation with emphasis on: water resource development, utilization and management; municipal, industrial, and individual sewage and solid waste disposal; metropolitan fringe area sanitation; air and water quality control methods and programs; particularly as they are related to environmental planning and control.

FOOD SCIENCE

PRINCIPLES OF FOOD TECHNOLOGY (Agriculture; Food Science 101–102). Throughout the year. Credit three or five hours a term. Prerequisites, Chemistry 106 and 303 or equivalent, Bacteriology 1, Physics 104. Lectures, T Th 10. Riley-Robb 225. Laboratory, Th 2–4:30. Riley-Robb 44. For those who register for 5 hours credit: prerequisite, a course in calculus, or analytical geometry and differential equations, and a course in biochemistry. Additional lecture and laboratory, T 1–4:30. Riley-Robb 44. Associate Professor BUCK.†

The fundamentals involved in the processing, production, and distribution of raw material to finished product, with emphasis on the unit operations and processes employed by the canning, freezing, fermentation, and dehydration industries. The fundamental and physical properties of foods, and their nutritive components, food additives and preservatives, and the principles of manufacture are discussed. Laboratory practice involves actual processing and preservation of various food products, and field trips.

FOOD BIOCHEMISTRY (Agriculture; Biochemistry 140). Spring. Credit three hours. Given in odd numbered years. Prerequisite,

Biochemistry 101. Lectures, M W F 11. Savage 100. Associate Professor SHALLENBERGER and staff members from the Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.†

A discussion of some of the important nonmicrobial changes in foods, such as denaturation and the Maillard browning reaction. Emphasis is placed on the occurrence, significance, and prevention or control of the changes as they affect the color, odor, flavor, texture, or nutritive value of foods.

FOOD BIOCHEMISTRY SEMINAR (Agriculture; Biochemistry 294). Fall. Credit one hour. Registration by permission. F 4:30. Savage 130. Professor BARNES, Associate Professor SHALLENBERGER, and staff members from the Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.

Assignments and discussions of literature pertaining to the biochemical aspects of foods and food processing.

FOOD PROCESSING INSTRUMENTATION (Agriculture; Food Science 106). Fall. Credit three hours. Prerequisite or concurrent, Food Science 101. Lectures, M W 9. Riley-Robb 225. Laboratory, F 2–4:30. Riley-Robb 146. Assistant Professor NOWREY.

Principles of engineering analysis and judgment are employed in examination of instruments for measurement and control of food processes. Topics include pressure, temperature, and flow measurements, plus selected instruments for measuring physical and chemical properties of foods. Electronic components of electrical instruments are discussed. The use of instruments in the enforcement of food laws is also presented.

FOOD ENGINEERING CALCULATIONS (Agriculture; Food Science 107). Spring. Credit three hours. Prerequisite, Food Science 101. Lectures, M W 9. Riley-Robb 225. Laboratory, F 2–4:30. Riley-Robb 146. Assistant Professor NOWREY.

Analysis and presentation of technical data collected from food processes using statistical and graphical methods. Empirical equations and dimensional analyses are also discussed. The use of computers in programing food processes is presented.

[***MARKET MILK (Agriculture; Dairy Science 102).*** Spring. Credit four hours. Given in alternate years. Prerequisites, Introductory Dairy Science 1 and Bacteriology 1 or its equivalent. Associate Professor MARCH and assistants.†

The scientific, technical, and sanitary aspects of the fluid milk industry. *Not given in 1963.*]

FOOD PRODUCTS FROM MILK FERMENTATIONS (Agriculture; Dairy Science 103). Fall. Credit five hours. Given in alternate years. Prerequisites, Introductory Dairy Science 1, Bacteriology 1, and organic chemistry or biochemistry. Professor KOSIKOWSKI and assistant.†

The chemistry, bacteriology, and technology of milk fermentations leading to important foods, including cheese, butter, yoghurt, sour cream, buttermilk, and fermented milks. Consideration is given to chemical by-products of milk fermentations such as casein, lactic acid, and alcohol. Line-flow processing practices are carried out in the laboratory.

CONCENTRATION AND FREEZING OF MILK AND MILK PRODUCTS (Agriculture; Dairy Science 104). Spring. Credit five hours. Given in alternate years. Prerequisite, Dairy Science 102. T Th 1–4:30. Stocking 119. Professor JORDAN and assistant.

The principles and practice of making condensed and evaporated milk, milk powders, ice cream, and by-products, including a study of the physical, chemical, and biological factors involved.

ANALYTICAL METHODS (Agriculture; Dairy Science 111). Spring. Credit four hours. Prerequisites, college physics and quantitative analysis. Lectures, T Th 11. Laboratory practice, T 12:30–4:30. Stocking 119. Professor HERRINGTON and assistant.†

A study of the more important operations and apparatus used in quantitative analysis, and their practical application.

CHEMISTRY OF MILK (Agriculture; Dairy Science 113). Fall. Credit two hours. Prerequisites, qualitative and quantitative analysis and organic chemistry. Lectures, M W 9. Stocking 120. Professor HERRINGTON.†

The subject matter changes from year to year. It may deal with colloidal phenomena in milk and its products. It may deal with the enzymes of milk, with milk proteins, with milk fat, or with chemical reactions and equilibria in dairy products. Graduate students may reregister in successive years and find little duplication of material.

DAIRY AND FOOD ENGINEERING (Agriculture; Dairy Science 130). Fall. Credit four hours. Prerequisites, Physics 103 and 104 or the equivalent, and Introductory Dairy Science 1. Lectures, M W F 10. Laboratory, M 2–4:30. Stocking 119. Professor JORDAN.†

Engineering aspects of dairy and food-plant operations.

MEAT AND MEAT PRODUCTS (Agriculture; Animal Husbandry 90). Fall or spring. Credit three hours. Animal Husbandry 1 is recommended before registering for this course. Lecture, T 8. Morrison 82. Laboratory, M W or T Th 2–4:30. Morrison 63. Registration limited to sixteen students in each section. Associate Professor STOUFFER.

Livestock slaughtering, retail meat cutting, live animals and carcass relationships, and the storage and preservation of meat and meat products. A one-day field trip to packing plants will be taken.

MEAT AND MEAT PRODUCTS (Agriculture; Animal Husbandry 92). Spring. Credit two hours. For women students. Not open to freshmen. Designed primarily for students in the College of Home Economics. Registration limited to sixteen students in each laboratory section. Lecture, Th 11. Morrison 82. Laboratory, Th or F 2–4:30. Morrison 63. Professor WELLINGTON and the poultry department staff.

The major phases of meats, poultry and eggs; wholesale and retail buying; nutritive value of meats; and cutting, freezing, curing, cooking, and miscellaneous topics.

[***POULTRY MEAT AND EGG TECHNOLOGY (Agriculture; Poultry Husbandry 150).*** Spring. Credit three hours. Given in alternate years. Prerequisites, Chemistry 303 or its equivalent and Bacteriology 1. Open to graduate students, juniors, and seniors. Professor BAKER.† *Not given in 1963.*]

Discussion and study of some of the important microbial and nonmicrobial changes in poultry meat and eggs as well as the chemical composition and preservation of these products. Development of new products is also emphasized.

POST-HARVEST PHYSIOLOGY, HANDLING, AND STORAGE OF FRUITS (Agriculture; Pomology 111). Fall. Credit three hours. Prerequisite, Pomology 1 or 2. Lectures, T Th 8. Plant Science 143. Laboratory, F 2–4:30. Plant Science 107. Professor SMOCK.†

The chemistry and physiology of fruits as they affect quality and marketability are studied. Handling methods, maturity indices, and storage practices are considered. Practical work involves grading and inspection of fruits and storage of fruit in different ways. One Saturday field trip is required.

POTATO PRODUCTION AND PROCESSING (Agriculture; Vegetable Crops 22). Spring. Credit three hours. Lectures, T Th 10. East Roberts 222. Laboratory, T or W 2–4:30. East Roberts 223. Professor SMITH.†

General principles and practical phases of potato production, storage, and processing are discussed. Growth processes and soil and environmental factors are emphasized as influencing production. Topics such as storage methods, grading, packaging, cooking quality, nutritive value, processing, and industrial uses of potatoes also are studied. Two field trips, one of which is all-day, are taken to potato farms and processing plants.

VEGETABLE CROPS, ADVANCED COURSE (Agriculture; Vegetable Crops 101). Fall. Credit four hours. Prerequisites, Vegetable Crops 11 and Botany 31. Intended primarily for advanced undergraduate and graduate students. Lectures, M W F 11. East Roberts 222. Laboratory, M 2–4:30. East Roberts 223. Professor KELLY.

A systematic study of the literature dealing with practices in vegetable production. Results of experiments that have been conducted or are being conducted are studied, and their application to the solution of practical problems is discussed.

HANDLING AND MARKETING VEGETABLES, ADVANCED COURSE (Agriculture; Vegetable Crops 112). Fall. Credit four hours. Primarily for graduate students and undergraduates specializing in marketing or food technology. Lectures, T Th 11. East Roberts 222. Laboratory, T or W 2–4:30. East Roberts 223. One-hour conference to be arranged. Professor HARTMAN.

(Students registered for the Tuesday laboratory are scheduled to go on a field trip at 9:30 a.m., Wednesday, the day on which classes officially begin at noon in the fall term.)

The handling of vegetables from harvest, whether for fresh market or processing, through the marketing channels to the consumer; personnel, facilities, machinery, and organization of the industry; quality measurement and grade standards; federal, state, and other regulations; principles and practices in precooling, storage, packaging, pre-packaging, other types of handling.

This course has the same lectures, laboratories, and field trips as Vegetable Crops 12. Much more outside reading of research and trade publications in the area covered by the course is required in Vegetable Crops 112 than in Course 12, and different examinations are given for the two courses.

[***RESEARCH METHODS IN VEGETABLE CROPS (Agriculture; Vegetable Crops 225).***

Spring. Credit four hours. Given in alternate years. Primarily for graduate students. Prerequisite, Vegetable Crops 101. It is recommended that Plant Breeding 210 and 211 precede or accompany this course. Professor KELLY and Associate Professor OYER.

A study of research techniques peculiar to vegetable crops. *Not given in 1963.*]

SPECIAL PROBLEMS FOR GRADUATE STUDENTS (Home Economics; Food and Nutrition 403). Fall and spring. Credit and hours to be arranged. Department staff.†

For graduate students recommended by their chairmen and approved by the instructor in charge for independent, advanced work. Experience in research laboratories in the department may be arranged.

FOOD PREPARATION

SCIENCE OF FOOD (Home Economics; Food and Nutrition 316). Fall. Credit three (lectures only) or four hours. Prerequisite, F.N. 215 or equivalent, and a college course in organic or biochemistry. Students who have had limited laboratory experience in comparative foods *must* register for four hours. Associate Professor HESTER, Professor PERSONIUS, and ———. Lecture, T Th S 9. Van Rensselaer 121. Laboratory, T 2–4. Van Rensselaer 358.†

Scientific principles underlying modern food theory and practice. The relation to food preparation of the physical and chemical properties of proteins, fats, starches, sugars, leavening agents, and pigments; the properties of true solutions and principles of crystallization; colloidal systems—gels, sols, foams, and emulsions. Laboratory experiments designed to illustrate the effect of varying ingredients and preparation procedures on the quality of food products.

SCIENCE OF FOOD—LABORATORY (Home Economics; Food and Nutrition 317). Fall. Credit one hour. Must be taken with or following F.N. 316. Associate Professor HESTER and ———. Laboratory, Th 2–4. Van Rensselaer 358.†

Laboratory experiments designed to illustrate the physicochemical behavior of colloidal and crystalline systems and chemical reactions of the food components.

EXPERIMENTAL FOOD METHODS (Home Economics; Food and Nutrition 318). Spring. Credit two hours. Prerequisite, Food and Nutrition 316. A course in statistics and Food and Nutrition 317 are desirable but not required. Laboratory, M F 1:30–4:30. Van Rensselaer 358. Associate Professor HESTER and ———.†

Application of scientific theories and methods in the design and performance of experimental food problems and in the interpretation and evaluation of results. Independent laboratory problems.

MEATS, POULTRY, AND FISH (Hotel Administration 206). Fall and spring. Credit three hours. Associate Professor WANDERSTOCK.†

Deals with the major phases of meats, poultry, and fish from the hotel, restaurant, club, and institutional standpoint; nutritive value, structure and composition, sanitation, selection and purchasing, cutting, freezing, cooking, carving, and miscellaneous topics. Required three-day field trip to visit purveyors in New York City included. Estimated cost for this trip ranges between $30 and $40.

READINGS IN FOOD (Home Economics; Food and Nutrition 404). Fall. Credit two hours. Prerequisite, Food and Nutrition 315, or equivalent. T Th 11. Van Rensselaer 301. Associate Professor ———.†

Critical review of current literature. Emphasis on experimental data basic to the scientific principles underlying modern theory and practice in food preparation.

SEMINAR IN FOOD (Home Economics; Food and Nutrition 421). Spring. Credit one hour. Professor PERSONIUS and department staff. T 4:30. Van Rensselaer 339.

BACTERIOLOGY

GENERAL BACTERIOLOGY (Agriculture; Bacteriology 1). Fall. Credit five hours. Prerequisite, Chemistry 102 or 106. Lectures, M W F 11. Stocking 218. Laboratory practice, M W or T Th 2–4:30. Stocking 301. Professor H. W. SEELEY and assistants.

An introductory course; general survey of the field of bacteriology, with the fundamentals essential to further work in the subject.

GENERAL BACTERIOLOGY (Agriculture; Bacteriology 2). Fall. Credit three hours. Prerequisite, Chemistry 102 or 106. Not open to undergraduate students in the College of Agri-

culture. Lectures, M W F 11. Stocking 218. Professor H. W. SEELEY. The same as the lecture part of Bacteriology 1. By special permission, this course may be elected by graduate students and advanced students in certain professional courses.

DAIRY AND FOOD MICROBIOLOGY (Agriculture; Bacteriology 101). Spring. Credit four hours. Prerequisite, Bacteriology 1. Lectures, T Th 8. Stocking 119. Laboratory, T Th 9–12. Stocking 321. Professor NAYLOR and assistant.

A study of the microorganisms of importance in foods, with laboratory practice in the use of standard methods for microbiological testing and control of food products.

[***ADVANCED BACTERIOLOGY (Agriculture; Bacteriology 103).*** Spring. Credit four hours. Given in alternate years. Prerequisites, Bacteriology I and organic chemistry. Associate Professor MACDONALD and assistants.

A study of the comparative physiological and ecological relationships among the bacteria. Such subjects as bacterial anatomy, cell growth, ecology, nutrition, and autotrophy are covered. Some of the more complex groups of bacteria, such as the photosynthetic bacteria, are studied in detail. Laboratory emphasis is on techniques for the isolation, cultivation, and rigorous study of these and other groups. *Not given in 1963.*]

ADVANCED MICROBIOLOGY (Agriculture; Bacteriology 104). Fall. For upperclassmen and graduate students. Credit four hours. Prerequisites, Bacteriology 1 and organic chemistry. Lectures and laboratory practice, T Th 1:40–4:30. Stocking 119. Assistant Professor ZAHLER and assistant.

A study of a variety of biological phenomena among viruses, bacteria, yeasts, and molds. Genetics, radiation effects, and unusual growth patterns will be among the topics included.

PHYSIOLOGY OF BACTERIA (Agriculture; Bacteriology 210). Fall. Credit two hours. Prerequisites, Bacteriology 1 and at least one additional course in bacteriology and one in organic chemistry. Organic chemistry may be taken concurrently. Lectures, T Th 10. Stocking 120. Professor DELWICHE.

The physiology of bacteria and the biochemistry of microbic processes.

APPLIED AND INDUSTRIAL MICROBIOLOGY (Agriculture; Bacteriology 212). Fall. Credit three hours. May be taken for two hours' credit with permission. Given in alternate years. Prerequisite, Bacteriology 1. Staff.

A survey of the microbiology of food, water, sewage, and industrial fermentations.

MORPHOLOGY AND CYTOLOGY OF BACTERIA (Agriculture; Bacteriology 213). Fall. Credit three hours. For seniors and graduate students. Lectures, T Th S 9. Stocking 119. Professor KNAYSI.

The morphology, cytology, and microchemistry of microorganisms.

CHEMISTRY OF BACTERIAL PROCESSES (Agriculture; Bacteriology 215). Spring. Credit two hours. For seniors and graduate students. Lectures, M W 11. Stocking 119. Professor DELWICHE.

The chemistry of metabolism, fermentation, and nutrition of microorganisms.

BIOCHEMISTRY

ELEMENTS OF BIOCHEMISTRY, LECTURES (Agriculture; Biochemistry 101). Fall. Credit four hours. Prerequisite, organic chemistry, or Food and Nutrition 215. M T Th S 8. Savage 100. Professor DANIEL.

For undergraduate and graduate students. A basic course dealing with the chemistry of biological substances and their transformations in living organisms.

ELEMENTS OF BIOCHEMISTRY, LABORATORY (Agriculture; Biochemistry 102). Fall. Credit two hours. Prerequisite, quantitative analysis or Food and Nutrition 215, or by permission of the instructor. Must be taken with or after Biochemistry 101. M W or T Th 2–4:20. Professor DANIEL, Associate Professor NEAL, and assistants.

Laboratory practice with biochemical substances and experiments designed to illustrate chemical reactions which may occur in biological systems.

FOOD BIOCHEMISTRY (Agriculture; Biochemistry 140). Spring. Credit three hours. Prerequisite, Biochemistry 101. Lectures, M W F 11. Savage 100. Associate Professor SHALLENBERGER and staff members from the Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.†

A discussion of some of the important nonmicrobial changes in foods, such as denaturation and the Maillard browning reaction. Emphasis is placed on the occurrence, significance, and prevention or control of the changes

as they affect the color, odor, flavor, texture, or nutritive value of foods.

BIOCHEMISTRY AND NUTRITION OF THE VITAMINS (Agriculture; Biochemistry 150). Spring. Credit two hours. Given in even-numbered years. Prerequisites, Chemistry 303 and 305, Biochemistry 101, or their equivalent. Primarily for graduate students. Lectures, T Th 10. Savage 100. Professor DANIEL.* †

The chemical, physiological, and nutritional aspects of the vitamins.

NUTRITIONAL BIOCHEMISTRY (Agriculture; Biochemistry 160). Spring. Credit three hours. Prerequisites, Biochemistry 101 or the equivalent and a beginning course in nutrition, e.g., Animal Husbandry 110, Poultry Husbandry 110, or Food and Nutrition 324. Lectures, M W F 10. Savage 100. Professors R. H. BARNES and WRIGHT and Assistant Professors GAYLOR and MCCORMICK.*

The biochemical bases of processes related to nutrition in the intact animal will be discussed. Emphasis will be placed on the integration of physiological and biochemical mechanisms in digestion, absorption, transport, and metabolism and will include comparative aspects of the normal and pathologic states.

GENERAL BIOCHEMISTRY, LECTURES (Agriculture; Biochemistry 201–202). Throughout the year. Credit four hours per term. Prerequisites, quantitative analysis, Organic Chemistry 307 and 308 or the equivalent, and Physical Chemistry 403 and 404 or the equivalent. Physical Chemistry may be taken concurrently. Biochemistry 201 is prerequisite to Biochemistry 202. M W F S 9. Savage 100. Professors WILLIAMS, NELSON, WRIGHT, and GIBBS, and Associate Professors HOLLEY and HESS.

A systematic treatment of the principles of biochemistry. The discussion will emphasize comparative cellular chemistry, bioenergetics, the metabolism of carbohydrates, lipides, and nitrogenous compounds, and the factors involved in the regulation and control of metabolic pathways.

GENERAL BIOCHEMISTRY, LABORATORY (Agriculture; Biochemistry 203). Spring. Credit three hours. Prerequisites, to follow the satisfactory completion of Biochemistry 201 and to accompany or follow Biochemistry 202. *Registration by permission of instructor.* M W or T Th 2–5. Savage 230. Professors NELSON, GIBBS, and WRIGHT, and Associate Professor HESS.

Selected experiments dealing with enzymes, co-factors, and substrates of importance in metabolic processes. Practice is given in the use of special techniques employed in isolation, characterization, and mode of action of enzymes and enzyme systems. Emphasis is placed on the interpretation of data and written reports covering the various experiments.

BIOCHEMISTRY SEMINAR (Agriculture; Biochemistry 290). Fall and spring. Required of graduate students majoring in biochemistry and open to all who are interested. F 4:15. Savage 100. Staff.

Assignments and discussions of recent advances in biochemistry.

NUTRITION SEMINAR (Agriculture; Biochemistry 292). Spring term. Credit one hour. Registration by permission. M 4:15. Savage 100. Professor R. H. BARNES.

FOOD BIOCHEMISTRY SEMINAR (Agriculture; Biochemistry 294). Fall. Credit one hour. Registration by permission. M 4:30. Savage 130. Professor BARNES, Associate Professor SHALLENBERGER, and staff members from the Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.

Assignments and discussions of literature pertaining to the biochemical aspects of foods and food processing.

SPECIAL TOPICS IN BIOCHEMISTRY (Agriculture; Biochemistry 301). Fall or spring. Credit one or two hours. Registration by permission of instructor. Lectures, discussions, and assignments to original literature. T 9. Professor WILLIAMS and staff.*

The special topic and the instructor will be announced each term prior to preregistration.

CHEMISTRY AND PHYSICS

[***CHEMISTRY OF NATURAL PRODUCTS (Arts and Sciences; Chemistry 574).*** Spring. Credit three hours. Prerequisites, Chemistry 456 or 457, and 465–466. Primarily for graduate students. Lecture, T Th 9.

Particular attention will be devoted to methods of structure determination and synthesis as applied to selected terpenes, steroids, alkaloids, and antibiotics. Given in alternate years. *Not offered in 1963.*]

INTRODUCTORY PHYSICAL CHEMISTRY (Arts and Sciences; Chemistry 285–286). Throughout the year. Credit five hours a term. Prerequisites, Chemistry 108, Mathematics 192, Physics 123, or consent of instructor. For

students in engineering. Lectures, M W F 9. Laboratories: fall term, M 1:40–4:30 and T 10–12:50 or W Th 1:40–4:30 or S 8–1; spring term, M T 1:40–4:30 or W Th 1:40–4:30 or F 1:40–4:30 and either S 8–10:50 or S 10–12:50. Associate Professor ALBRECHT and Assistant Professor WUNDERLICH and assistants.

The lectures will give a systematic treatment of the fundamental principles of physical chemistry; the laboratory will deal with the experimental aspects of the subject and also develop the needed skills in quantitative chemical analysis.

INTRODUCTORY PHYSICAL CHEMISTRY (Arts and Sciences; Chemistry 387–388). Throughout the year. Credit five hours a term. Prerequisites, Chemistry 235, Mathematics 113 or 221, Physics 208, or consent of instructor. Chemistry 387 is prerequisite for Chemistry 388. Required of candidates for the degree of A.B. with a major in chemistry. Lectures, M W F 10. Laboratory: fall term, T 1:40 or F 1:40–4:30; spring term, M T 1:40–4:30 or W F 1:40–4:30 or S 8–1. Laboratory lecture (fall term only), Th 12. Examinations, Th 7:30 p.m.

A study of the more fundamental principles of physical chemistry from the standpoint of the laws of thermodynamics and of the kinetic theory. The laboratory will consist of experiments illustrating laboratory techniques as well as experiments in classical and modern physical chemistry.

[***PHYSICAL CHEMISTRY OF PROTEINS (Arts and Sciences; Chemistry 586).*** Spring. Credit four hours. Prerequisite, Chemistry 286 or 388. Primarily for graduate students. Lectures, M W F 8. Professor SCHERAGA.

Chemical constitution, molecular weight, and structural basis of proteins; thermodynamic, hydrodynamic, optical, and electrical properties; protein and enzyme reactions. *Not offered in 1963.*]

PHYSICS FOR STUDENTS OF BIOLOGY (Arts and Sciences; Physics 200). Either term. Credit four hours. Prerequisites, Physics 101–102, six credit hours of college work in chemistry, and six in biological science. Students having a grade below 70 in either Physics 101 or 102 may not register for the course without permission of the instructor. Lectures, T Th 12. Laboratory, T or F 2–4. One discussion period per week to be arranged. Professor L. L. BARNES and staff.

Lectures, laboratory experiments, and small discussion groups, dealing with selected topics related to the study of biology. Topics selected from: the properties of matter, electricity, electromagnetic radiation, and nuclear physics.

ECONOMICS

FOOD ECONOMICS (School of Nutrition 159). Spring. Credit three hours. Designed especially for students in the Graduate School of Nutrition and in the College of Home Economics. Not open to students in the College of Agriculture except by permission of the instructor. Lectures and discussion, M W F 8. Savage 100. Associate Professor CALL.†

Economic aspects of food, including production, distribution, and consumption, with special emphasis on the economics of diet.

MARKETING (Agriculture; Agricultural Economics 140). Spring. Credit three hours. Lectures, M W F 11 except for weeks when field trips are taken, then M F lectures only. Warren 45. Field trips, T W or Th 1:30–5:30. Professor DARRAH.

A study of how farm products are marketed. Special attention is given to the consumption of farm products, the factors that affect consumption, production areas, market channels, the operation of different marketing agencies, marketing services, and costs. One all-day and five half-day trips are taken to visit marketing agencies.

SEMINAR IN FOOD AND POPULATION (School of Nutrition 250). Spring. Credit two hours. Open only to graduate students. Registration by permission. W 7:30 p.m. Savage 130. Professor VAN VEEN and Associate Professor CALL.†

Demographic behavior, population and food supply, comparative agriculture.

SURVEY OF INDUSTRIAL AND LABOR RELATIONS (Industrial and Labor Relations 293). Credit three hours. Either term. Professor CARPENTER.

A survey for students in other divisions of the University. An analysis of the major problems in industrial and labor relations: labor union history, organization, and operation; labor market analysis and employment practices; industrial and labor legislation and social security; personnel management and human relations in industry; collective bargaining; mediation and arbitration; the rights and responsibilities of employers and employees; the major governmental agencies concerned with industrial and labor relations.

ADVANCED ORGANIZATION AND MANAGEMENT (Home Economics; Institution Management 425). Fall. Credit two hours. Instructor's signature required for preregistration. T Th 2. Van Rensselaer 124. Associate Professor BURGOIN.

Analysis and interpretation of major administrative problems in the operation of a dietary department. Scientific application of business management, budgetary, and production control principles are studied in relation to quantity meal service.

INDUSTRIAL ORGANIZATION AND MANAGEMENT (Mechanical Engineering 3235). Fall. Credit three hours a term. Three lectures a week. Associate Professor SAMPSON.

Management of an industrial enterprise; internal organization; effect of type of product, methods of manufacture, size of enterprise, and personnel involved; types of enterprises; plant location; centralization and decentralization trends; diversification and specialization; growth of industry.

PERSONNEL MANAGEMENT (Mechanical Engineering 3232). Fall. Credit three hours. Three recitations a week. Intended for graduate students but open to qualified undergraduates. Prerequisite, Mechanical Engineering 3241 or permission. Associate Professor SAMPSON.

Techniques of employee selection and evaluation, job evaluation, training, motivation; personnel department organization and interdepartmental relations.

MATHEMATICS

CALCULUS (Arts and Sciences; Mathematics 111). Either term. Credit three hours. Hours to be arranged. Plane analytic geometry, differentiation and integration of algebraic functions, applications.

CALCULUS (Arts and Sciences; Mathematics 112). Either term. Credit three hours. Prerequisite, Mathematics 111. Fall, M W F 9, 10; T Th S 9, 10. Spring: M W 10, 11; T Th 10, 11.

Differentiation and integration of elementary functions; the technique of integration, plane analytic geometry. Applications.

CALCULUS (Arts and Sciences; Mathematics 113). Either term. Credit three hours. Prerequisite, Mathematics 112. Fall: lectures, M W 8, 10; T Th 8, 10, plus one hour to be arranged. Spring: M W F 8, 10.

Solid analytic geometry and vectors, partial differentiation; linear differential equations; infinite series.

STATISTICAL METHODS I.[1] ***(Agriculture; Plant Breeding 210).*** Fall. Credit one, three, or four hours. Prerequisite, graduate standing or permission of instructor. T Th S 10. Warren 345. Laboratory to be arranged. Associate Professor ROBSON.

The distributions of statistics encountered in biological and other fields are considered from the point of view of elementary probability notions and by sampling from known populations. The results, with principles of experimentation, are applied to the conduct of experiments and interpretation of results. The nature and validity of experimental error are treated. Topics include point and interval estimation, tests of hypotheses, the simpler experimental designs and their analyses of variance, linear regression and correlation.

STATISTICAL METHODS II.[1] ***(Agriculture; Plant Breeding 211).*** Spring. Credit one, three, or four hours. Prerequisite, Plant Breeding 210 or the equivalent. T Th S 10. Warren 345. Laboratory to be arranged. Associate Professor ROBSON.

The work of Plant Breeding 210 is continued. Topics include factorial experiments, individual degrees of freedom, analysis of covariance, analysis of variance of two-way classifications with disproportionate numbers, multiple and curvilinear regression, curve fitting, the treatment of discrete data, some recent developments in statistics.

ECONOMIC AND SOCIAL STATISTICS (Industrial and Labor Relations 510). Fall or spring. Credit three hours.

A nonmathematical course for graduate students in the social studies without previous training in statistical method. Emphasis will be placed on discussion of technical aspects of statistical analysis and on initiative in

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[1] An additional hour per week is devoted to algebraic derivations and manipulations associated with the statistical techniques and computational procedures of the lectures and laboratory. The purpose is to give the student a better understanding of statistics and to improve his background for further work in statistics, such as Plant Breeding 213. This additional hour may be taken for one hour credit with or without the regular three hours credit.

selecting and applying statistical methods to research problems. The subjects ordinarily covered will include analysis of frequency distributions, time series (including index numbers), regression and correlation analysis, and selected topics from the area of statistical inference.

PRINCIPLES OF COST ACCOUNTING (Mechanical Engineering 3231). Fall and spring. Credit three hours. Two lectures and one computing period a week.

Basic accounting theory; historical and standard cost system; cost analysis; uses of costs for control and decision purposes.

PHYSIOLOGY AND HISTOLOGY

GENERAL AND COMPARATIVE PHYSIOLOGY, LECTURES (Arts and Sciences; Zoology 441). Fall. Credit three hours. Prerequisites, one year of biology or zoology and college courses in chemistry. Organic chemistry desirable. Lectures, M W F 9. Assistant Professor McFARLAND.

The principal physiological functions of both vertebrates and invertebrates, including muscle contraction, nerve action, respiration, metabolism, digestion, circulation, excretion, and physiological regulation.

GENERAL AND COMPARATIVE PHYSIOLOGY, LABORATORY (Arts and Sciences; Zoology 443). Fall. Credit one hour. Must be taken with Zoology 441. Limited to 60 students. T 8–11; M T F 1:40–4:30; S 8–11. Assistant Professor McFARLAND.

CELLULAR PHYSIOLOGY (Arts and Sciences; Zoology 541). Fall. Credit four hours. Prerequisites, animal or plant physiology, organic chemistry, physics, and consent of the instructor. Biochemistry and histology, genetics or cytology are also desirable. Enrollment is limited. Lectures, M W 11. Seminar, T 1:40–4:30. Laboratory, W or Th 1:40–4:30. Assistant Professor REEVES.

An introduction to basic problems of cellular function including structural and functional organization of cells, role of nucleic acids, permeability and active transport, contractility, excitability, metabolism, growth and cellular interactions. The laboratory emphasizes a number of biophysical approaches to cellular activities.

CELLULAR PHYSIOLOGY LECTURES (Arts and Sciences; Zoology 543). Fall. Credit two hours. Prerequisite, organic chemistry. Zoology 443 or Zoology 321 or plant physiology is also desirable. This course consists of the lecture part of Zoology 544. Assistant Professor REEVES.

EXPERIMENTAL ENDOCRINOLOGY (Arts and Sciences; Zoology 540). Spring. Credit two or three hours. Prerequisites, a year of zoology, organic chemistry, physiology, and consent of the instructor. Primarily for graduate students; open to undergraduates for two credits. Lectures, M F 11. Laboratory, M 2–4:30. Professor LEONARD.

Lectures on anatomy, physiology of the vertebrate endocrine glands, glandular interrelationships; chemical and physiological properties of hormones, assay methods. Laboratory, small-animal surgery and microtechnique for the endocrines, illustrative experiments on the effects of hormones.

FUNDAMENTALS OF ENDOCRINOLOGY (Agriculture; Animal Husbandry 127). Fall. Credit three hours. Lectures, T Th 10. Morrison 38. Laboratory to be arranged. Professor HANSEL.

A general course in the physiology of the endocrine glands, and the roles played by each hormone in the regulation of normal body processes. The laboratory work consists of a series of projects designed to illustrate the basic principles of endocrinology and their applications to more efficient production in all classes of livestock.

PHYSIOLOGY OF REPRODUCTION (Agriculture; Animal Husbandry 125). Spring. Credit two hours. Open to graduate students and upperclassmen. Prerequisite, a course in human or veterinary physiology. Lectures, M W 10. Morrison 342. Professor ASDELL.

An advanced course in reproduction, principally in mammals.

HISTOLOGY: THE BIOLOGY AND DEVELOPMENT OF THE TISSUES (Arts and Sciences; Zoology 301). Fall. Credit four hours. Prerequisites, Zoology 101–102, or 103–104, and 321–322. Lectures, T Th 11. Laboratory, T Th 8–10:30 or 2–4:30. Professor WIMSATT and assistants.

A survey of the structure, functions, and development of the tissues. The treatment is general, designed to provide students of biology with a basis for the understanding of normal and abnormal structure of the vertebrates. Each student will make for his own use a series of typical microscopic preparations.

SPECIAL HISTOLOGY: THE BIOLOGY OF THE ORGANS (Arts and Sciences; Zoology 426). Spring. Credit four hours. Prerequisite, Zoology 325. Enrollment limited to 20 students. Lectures, W F 9. Laboratory, W F 2–4:30. Professor WIMSATT and assistants.

A continuation of Zoology 325. Zoology 325 and 426 together give the fundamental facts of the microscopic structure and function of the body. Opportunity to gain knowledge of technique in the fixing, embedding, and sectioning of selected organs is also offered.

PHYSICAL BIOLOGY

RADIOISOTOPES IN BIOLOGICAL RESEARCH—PRINCIPLES AND PRACTICE (Veterinary; Physical Biology 100). Spring. Credit four hours. Lectures, T Th 11. Laboratory, M T or W 1:30–5. Prerequisites, a course in quantitative chemistry and permission of instructor. Professor COMAR and staff.

Lectures, demonstrations, and laboratory on the fundamentals of atomic energy procedures and applications to biological research.

BIOLOGICAL EFFECTS OF RADIATION (Veterinary; Physical Biology 104). Spring. Credit two hours. Lectures, T Th 10. Lecturer to be designated.

Lectures and demonstrations on radiation physics, radiation chemistry, radiation effects at the cellular level, radiation effects in multicellular organisms, genetic effects of radiation, radioprotective and radiomimetic substances.

[***BIOLOGICAL MEMBRANES AND NUTRIENT TRANSFER (Veterinary; Physical Biology 108).*** Spring. Credit two hours. Lectures, T 8, F 11. Prerequisites, animal or plant physiology, quantitative and organic chemistry, physics, and consent of instructor. Cellular physiology and elementary physical chemistry desirable. Associate Professor WASSERMAN. *Not given in 1963.*]

Lectures and demonstrations on biophysical properties of biological membranes, theoretical aspects of permeability and transport, and mechanism of transfer of inorganic and organic substances across intestine, placenta, kidney, erythrocytes, bacteria and other biological systems.

PHYSIOLOGY (Veterinary; Physiology 12). Fall. Credit three hours. Prerequisites, Physiology 11, Anatomy 1 and 2, or Anatomy 9 or Zoology 211–212 and Biochemistry 102. Professor SELLERS and Associate Professors BERGMAN and NANGERONI.

Lectures and demonstrations on blood and lymph, circulation, respiration, digestion, and absorption.

PHYSIOLOGY (Veterinary; Physiology 13). Spring. Credit three hours. Prerequisite, Physiology 12. T W Th 8. Professor SELLERS, Associate Professor BERGMAN, and Assistant Professor BOYD.

Lectures and demonstration on the muscular and nervous systems. Special senses, excretion, metabolism, temperature regulation, endocrine organs, and reproduction.

EXPERIMENTAL PHYSIOLOGY FOR GRADUATE STUDENTS (Veterinary; Physiology 20). Spring. Prerequisites as for Physiology 12, coregistration in Physiology 13. Laboratory, W F 1–4. Registration limited. Consent of instructor required. Associate Professor NANGERONI.

PATHOLOGY AND BACTERIOLOGY

PATHOLOGY OF NUTRITIONAL DISEASES (Veterinary; Pathology and Bacteriology 155). Spring. Credit three hours. Lecture and laboratory. Hours to be arranged. Designed primarily for graduate students of nutrition. Prerequisites, Pathology and Bacteriology 40 and 40a. Associate Professor KROOK.*

SOCIAL STUDIES

THE SOCIOLOGY OF SOCIAL WORK (Agriculture; Rural Sociology 124). Fall. Credit three hours. Not open to freshmen or sophomores. Prerequisite, Rural Sociology 1 or equivalent. Lectures and discussions, M W F 9. Warren 232. Associate Professor TAIETZ.

The sociology of occupations. Social work is treated as a case study of the professionalization of an occupation. The following topics are covered: (1) the function of work for society and the individual; (2) bureaucratic structure and specialization; (3) the develop-

ment of occupational norms and identification; (4) occupational status; (5) the process of occupational selection; (6) dynamics of occupational change—horizontal and vertical mobility; (7) a case study of an occupation: trends in the professionalization of social work.

PSYCHODYNAMICS OF PERSONALITY (Home Economics; Child Development and Family Relationships 360). Fall. Credit three hours. Prerequisite, Child Development 315 or Rural Education 111 or Psychology 103 or equivalent. Open to juniors and seniors; graduate students admitted by permission of the instructor. Limited to forty-five students. M W F 11. Van Rensselaer 117. Professor DALTON.

Psychological influences in the development and functioning of persons. Special attention will be given to basic determinants of personality; structure of the personality; personality in social and cultural context; the influence of conscious and unconscious processes in behavior.

RURAL COMMUNITY ORGANIZATION (Agriculture; Rural Sociology 111). Fall. Credit three hours. Prerequisite, Rural Sociology 1 or 12 or permission of the instructor. T Th 11–12:30. Warren 31. Associate Professor REEDER.

A consideration of the problems involved in helping people and organizations in a community work together to meet their common needs.

Problems which arise in helping schools, churches, farm organizations, and civic groups in integrating themselves into the life of the community are one part of this consideration. Students are given the opportunity to practice some organization techniques which have been found successful in community organization work.

CULTURAL ANTHROPOLOGY (Arts and Sciences; Anthropology 301).[2] Fall. Credit four hours. M W F 12. Professor SHARP.

A study and comparison of the types of learned, shared, and transmitted behavior patterns and ideas by means of which men of various periods and places have dealt with their environment, worked out their social relations with their fellow men, and defined their place in the cosmos. An inquiry into human nature and its expression in man's institutional and intellectual creations.

CULTURE AND PERSONALITY (Arts and Sciences; Anthropology 312).[2] Spring. Credit four hours. Prerequisite, one course at the 100 or 200 level in anthropology, sociology, psychology, or zoology. M W F 10. Professors LAMBERT and OPLER.

The study of the individual in his society, emphasizing the relationship between social structure, cultural context, and human behavior. Attention is given largely to the study of personality, "normal" and "abnormal," in non-Western societies.

COMPARATIVE SOCIAL ORGANIZATION (Arts and Sciences; Anthropology 321).[2] Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of instructor. M W F 3. Professor SHARP.

The varied organization of human relations in selected non-Western societies; case studies of territorial, sex, age, kinship, clique, club, class, and caste bases of interaction and association; the ordering of social roles into systems of conduct; the relations of conduct to technology and world view.

ETHNOLOGY OF NORTH AMERICA (Arts and Sciences; Anthropology 331).[2] Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of instructor. M W F 9. Professor ROBERTS.

A general survey of the ethnography of North America, with emphasis on problems and topics to which the North American materials are most relevant. Selected cultures will be considered in some detail.

ETHNOLOGY OF MIDDLE AND SOUTH AMERICA (Arts and Sciences; Anthropology 332).[2] Spring. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of instructor. M W F 9. Professor HOLMBERG.

A descriptive and analytical survey of contemporary native cultures of Middle and South America in terms of economic, social, political, and religious organization. Representative groups from all cultural areas are considered, ranging from such marginal peoples as the Tierra del Fuegians to such complex civilizations as the Inca.

ETHNOLOGY OF SOUTHEAST ASIA AND OCEANIA (Arts and Sciences; Anthropology 334).[2] Spring. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of instructor. T Th 2–2:30. Professor SHARP.

The development and distribution of major culture types in mainland and island Southeast Asia and their extension into Oceania. Discussion of selected groups and of the fate of traditional cultural characteristics following the expansion of Chinese, Indian, Moslem, and Western civilizations into these areas.

[***ETHNOLOGY OF THE CIRCUMPOLAR AREA (Arts and Sciences; Anthropology 336).***[2]

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[2] See the *Announcement of the College of Arts and Sciences* for further offerings in this area.

Spring. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of instructor. M W F 2. *Not given in 1963.*]

A survey of native cultures of the North in the New and Old Worlds, dealing with problems of ethnohistory, social structure and cultural organization, aspects of ethnopsychiatry, and change in the modern world.

ETHNOLOGY OF AFRICA (Arts and Sciences; Anthropology 337).[2] Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of the instructor. T Th S 9.

CULTURE AND SOCIETY IN INDIA AND SOUTH ASIA (Arts and Sciences; Anthropology 341).[2] Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of the instructor. M W F 9. Professor OPLER.

THEORY OF CULTURE CHANGE (Arts and Sciences; Anthropology 413).[2] Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of the instructor. M W F 11. Professor HOLMBERG.

A study of the various theories of cultural change and their relevance to the on-going social process; an analysis of such concepts as innovations, diffusion, and acculturation in relation to culture change theory; a consideration of factors involved in maintaining stability or stimulating change in nonindustrialized cultures.

SEMINAR: APPLIED ANTHROPOLOGY (Arts and Sciences; Anthropology 482).[2] Spring. Credit four hours. Prerequisite, consent of instructor. M 4–6. Professor HOLMBERG.

The principles of anthropology applied to planned programs of change. Designed not only for students of the humanities and different societies but also for natural scientists concerned with social and cultural problems involved in technological change, community development, native administration, and modernization in various regions of the world. The seminar is designed especially to prepare advanced undergraduate and graduate students for technical missions abroad.

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[2] See the *Announcement of the College of Arts and Sciences* for further offerings in this area.

RESEARCH

SPECIAL PROBLEM (School of Nutrition 199). Report of individual problem under direction of any member of the faculty of the Graduate School of Nutrition. See page 6 for details.

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